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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,604	01/26/2005	Masahiro Harada	2004-2027A	1652
513 7590 08/31/2009 WENDEROTH, LIND & PONACK, L.L.P. 1030 15th Street, N.W., Suite 400 East Washington, DC 20005-1503				
EXAMINER YOUNG, NATASHA E				
ART UNIT		PAPER NUMBER		
1797				
MAIL DATE		DELIVERY MODE		
08/31/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/522,604

Applicant(s)

HARADA ET AL.

Examiner

NATASHA YOUNG

Art Unit

1797

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1.4.5 and 8-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1.4.5 and 8-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 24, 2009 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

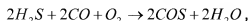
The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herrington et al (US 4,618,723) in view of Tung et al (US 2003/0027912 A1)

Regarding claim 1, Herrington et al discloses a COS treatment apparatus for a gasified gas containing COS, H₂S, H₂O, O₂, and CO, which comprises: a first reactor into which the gasified gas is to be introduced, the first reactor being configured to increase an initial concentration of COS in the gas and decrease concentration of H₂S, CO, and O₂ in the gas at a gas temperature of at least 300°C; a second reactor located at a downstream side of a gasified gas flow with respect to the first reactor, the second reactor being configured to decrease the increased concentration of COS in the gas passed through the first reactor to a concentration lower than the initial concentration of COS in the gas, wherein the first reactor comprises an O₂ removal catalyst for accelerating the following reaction:



the O₂ removal catalyst comprising of TiO₂ and Cr₂O₃ or comprising of TiO₂ and NiO (see column 3, line 26 through column 4, line 45 and figure 1) which discloses a catalyst which is typically an oxide of a Group 8 metal and a support which can be titanium oxide.

Herrington et al does not disclose the O₂ removal catalyst consisting of TiO₂ and Cr₂O₃ or consisting of TiO₂ and NiO.

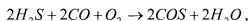
Tung et al disclose that TiO₂, Cr₂O₃, and NiO an oxygen-scavenging elements (see paragraph 0029).

It would have been obvious to choose the O₂ removal catalyst consisting of TiO₂ and Cr₂O₃ or consisting of TiO₂ and NiO from a finite number of identified, predictable solutions for oxygen removal catalyst (or oxygen-scavenging elements, i.e., to would have been "obvious to try" the specific structure of the O₂ removal catalyst consisting of TiO₂ and Cr₂O₃ or consisting of TiO₂ and NiO to enhance reaction with molecular oxygen.

Regarding claim 4, Herrington et al discloses a COS treatment apparatus wherein said O₂ removal catalyst is located in a higher-temperature region with respect to said COS conversion catalyst (see column 3, line 26 through column 4, line 9).

Regarding claim 9, Herrington et al discloses a COS treatment apparatus for a gasified gas containing COS, H₂S, H₂O, O₂, and CO, comprising: a reactor into which the gasified gas is to be introduced, the reactor being configured to convert COS to H₂S in the presence of O₂, the reactor comprising a TiO₂ catalyst carrying Cr₂O₃, wherein

TiO₂ catalyst carrying Cr₂O₃ is an O₂ removal catalyst for accelerating the following reaction:



wherein the TiO₂ catalyst carrying Cr₂O₃ is a COS conversion catalyst (see column 3, line 26 through column 4, line 45 and figure 1).

Herrington et al does not disclose the reactor comprising a TiO₂ catalyst carrying Cr₂O₃ and BaO, wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is an O₂ removal catalyst and wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is a COS conversion catalyst.

However, Herrington et al discloses the use of metal compounds from Group 2a which includes barium (see column 3, lines 26-55).

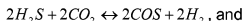
Tung et al disclose that TiO₂, Cr₂O₃, and BaO an oxygen-scavenging elements (see paragraph 0029).

It would have been obvious to choose the reactor comprising a TiO₂ catalyst carrying Cr₂O₃ and BaO, wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is an O₂ removal catalyst and wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is a COS conversion catalyst from a finite number of identified, predictable solutions for oxygen removal catalyst (or oxygen-scavenging elements), i.e., to would have been "obvious to try" the specific structure of the reactor comprising a TiO₂ catalyst carrying Cr₂O₃ and BaO, wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is an O₂ removal catalyst and

wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is a COS conversion catalyst to enhance reaction with molecular oxygen.

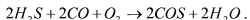
Claims 5, 8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herrington et al (US 4,618,723) and Tung et al (US 2003/0027912 A1) in view of Wachs (US 6,497,855 B1) and Borsboom et al (US 4,981,661).

Regarding claim 5, Herrington et al discloses a COS treatment method for a gasified gas containing H₂S and CO, the method comprising: increasing an initial concentration of COS in the gas and decreasing concentration of H₂S, CO and O₂ in the gas by using an O₂ removal catalyst comprising of TiO₂ and Cr₂O₃ or comprising of TiO₂ and NiO at a gas temperature of at least 300°C to accelerate the following reaction:



after the increasing of the initial concentration of COS in the gas and the decreasing of the concentration of H₂S, CO and O₂ in the gas, decreasing the increased concentration of COS in the gas to a concentration lower than the initial concentration of COS in the gas by converting COS contained in the gas to H₂S by using a COS conversion catalyst (see column 3, line 26 through column 4, line 45 and figure 1).

Herrington does not disclose a COS treatment method for a gasified gas containing COS, H₂S, H₂O, O₂, and CO, the method comprising: increasing an initial concentration of COS in the gas and decreasing concentration of H₂S, CO and O₂ in the gas by using an O₂ removal catalyst consisting of TiO₂ and Cr₂O₃ or consisting of TiO₂ and NiO at a gas temperature of at least 300°C to accelerate the following reaction:



Tung et al disclose that TiO_2 , Cr_2O_3 , and NiO an oxygen-scavenging elements (see paragraph 0029).

It would have been obvious to choose the O_2 removal catalyst consisting of TiO_2 and Cr_2O_3 or consisting of TiO_2 and NiO from a finite number of identified, predictable solutions for oxygen removal catalyst (or oxygen-scavenging elements, i.e., to would have been "obvious to try" the specific structure of the O_2 removal catalyst consisting of TiO_2 and Cr_2O_3 or consisting of TiO_2 and NiO to enhance reaction with molecular oxygen.

Wachs discloses that carbonyl sulfide (COS) is found in many industrial process streams such as coal gasification (see column 1, lines 27-44) and the reaction of carbon monoxide with hydrogen sulfide forms carbonyl sulfide (see column 5, line 59 through column 6, line 25).

Borsboom et al discloses the gas from a coal gasification process commonly contains hydrogen sulfide, carbon monoxide, and sometimes also oxygen (see column 1, lines 12-19).

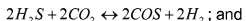
It would have been obvious to choose a gasified gas containing COS, H_2S , H_2O , O_2 , and CO and an O_2 removal catalyst consisting of TiO_2 and Cr_2O_3 or consisting of TiO_2 and NiO at a gas temperature of at least $300^\circ C$ to accelerate the following reaction:

$2H_2S + 2CO + O_2 \rightarrow 2COS + 2H_2O$ from a finite number of identified, predictable solutions for catalytically converting COS without expensive waste of valuable hydrogen

and reducing the production of carbon dioxide, which is considered to be an environmental threat, i.e., it would have been "obvious to try" the specific compositions of the feed and O₂ removal catalyst to catalytically converted COS without expensive waste of valuable hydrogen and reducing the production of carbon dioxide, which is considered to be an environmental threat.

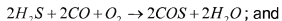
Regarding claim 8, Herrington et al discloses a COS treatment method wherein said O₂ removal catalyst is located in a higher-temperature region with respect to said COS conversion catalyst (see column 3, line 26 through column 4, line 9).

Regarding claim 10, Herrington et al discloses a COS treatment method for a gasified gas containing H₂S and CO, the method comprising: removing O₂ from the gas by using a TiO₂ catalyst carrying Cr₂O₃ to accelerate the following reaction:



simultaneously converting COS to H₂S by using the TiO₂ catalyst carrying Cr₂O₃ (see column 3, line 26 through column 4, line 45 and figure 1).

Herrington does not disclose a COS treatment method for a gasified gas containing COS, H₂S, H₂O, O₂, and CO, the method comprising: removing O₂ from the gas by using a TiO₂ catalyst carrying Cr₂O₃ and BaO to accelerate the following reaction:



simultaneously converting COS to H₂S by using the TiO₂ catalyst carrying Cr₂O₃ and BaO.

However, Herrington et al discloses the use of metal compounds from Group 2a which includes barium (see column 3, lines 26-55).

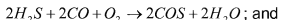
Tung et al disclose that TiO_2 , Cr_2O_3 , and BaO an oxygen-scavenging elements (see paragraph 0029).

It would have been obvious to choose removing O_2 from the gas by using a TiO_2 catalyst carrying Cr_2O_3 and BaO from a finite number of identified, predictable solutions for oxygen removal catalyst (or oxygen-scavenging elements), i.e., to would have been "obvious to try" the specific structure of the reactor comprising a TiO_2 catalyst carrying Cr_2O_3 and BaO , wherein the TiO_2 catalyst carrying Cr_2O_3 and BaO is an O_2 removal catalyst and wherein the TiO_2 catalyst carrying Cr_2O_3 and BaO is a COS conversion catalyst to enhance reaction with molecular oxygen.

Wachs discloses that carbonyl sulfide (COS) is found in many industrial process streams such as coal gasification (see column 1, lines 27-44) and the reaction of carbon monoxide with hydrogen sulfide to form carbonyl sulfide by using the TiO_2 catalyst carrying Cr_2O_3 (see column 3, lines 39-64 and column 5, line 59 through column 6, line 25).

Borsboom et al discloses the gas from a coal gasification process commonly contains hydrogen sulfide, carbon monoxide, and sometimes also oxygen (see column 1, lines 12-19).

It would have been obvious to choose a COS treatment method for a gasified gas containing COS, H_2S , H_2O , O_2 , and CO , the method comprising: removing O_2 from the gas by using a TiO_2 catalyst carrying Cr_2O_3 to accelerate the following reaction:



simultaneously converting COS to H₂S by using the TiO₂ catalyst carrying Cr₂O₃ for catalytically converting COS without expensive waste of valuable hydrogen and reducing the production of carbon dioxide, which is considered to be an environmental threat, i.e., it would have been "obvious to try" the specific compositions of the feed and O₂ removal catalyst to catalytically converted COS without expensive waste of valuable hydrogen and reducing the production of carbon dioxide, which is considered to be an environmental threat.

Response to Arguments

Applicant's arguments with respect to claims 1, 4-5, and 8-10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See Erickson (US 4,287,170).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATASHA YOUNG whose telephone number is 571-270-3163. The examiner can normally be reached on Mon-Thurs 7:30 am-6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. Y./
Examiner, Art Unit 1797

/Walter D. Griffin/
Supervisory Patent Examiner, Art Unit 1797